

Efficacy of micro-needling in patients of localized vitiligo: A single group clinical trial

Maheen Fatima, Raheel Tahir, Hira Tariq*, Alina Abbass*, Saelah Batool*, Faria Asad*

Department of Dermatology, Nishtar Medical University and Hospital, Multan.

* Department of Dermatology, SIMS/ Services Hospital, Lahore.

Abstract

Objective To ascertain the effectiveness of micro needling in tertiary care patients with localised vitiligo.

Methods It was a single group clinical trial conducted at Dermatology Department of Nishtar Medical University, Multan. Local anaesthetic was injected into the chosen vitiligo lesions while adhering to aseptic precautions. Next, dermapen micro needling was performed very slowly, with needle penetrating depths varying from 0.25 to 0.5 mm over the face and 1 to 2 mm over the body in both directions (horizontal and vertical), until the end-point of pin point bleeding.

Results Of total 111 study cases, 45 (40.5%) were males while 66 (59.5%) were females. Patients had a mean age of 27.91 ± 9.49 years. Family history of vitiligo was positive in 22 (19.8%) of our study cases and 45 (40.5%) were married while 66 (59.5%) were unmarried. Of these 111 study cases, efficacy was seen in 81 (73.0%) of patients.

Conclusion Results of this study use of micro-needling in localized vitiligo, as it was found highly effective, safe and reliable in the targeted population. No adverse events were encountered among study cases and efficacy of micro-needling was significantly dependent upon disease duration. Physicians treating these patients can effectively employ micro-needling for treating localized vitiligo to achieve desired clinical outcomes to relieve these patients from psycho – social stress.

Key words

Localized vitiligo; Micro-needling; Efficacy.

Introduction

Despite the availability of numerous treatment options, vitiligo, one of the most prevalent cutaneous disorders of depigmentation, remains a significant dermatological challenge due to its complicated genetic, immunological, and environmental connections. Even though it doesn't cause any symptoms, it can significantly lower someone's quality of life. Significant

psychological manifestations, such as sadness and low self-esteem, may occur.^{1,2} According to reports, vitiligo affects 0.5-2% of people worldwide and is racial and gender-neutral. The pathophysiology of this condition has been explained by three major hypotheses: autoimmune, neurological, and biochemical/cytotoxic. Numerous investigations have shown a correlation between vitiligo and autoimmune thyroid disorders in the context of hyper- or hypothyroidism. Topical, oral, and phototherapy immunomodulators are the mainstays of treatment.^{3,4} Various surgical techniques have been developed to date which include tissue grafts (full-thickness punch graft, split-thickness grafts, suction blister grafts) and cellular grafts (cultured melanocytes, non-cultured epidermal cellular grafts).^{5,6}

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Address for correspondence

Dr. Hira Tariq

Assistant Professor,

Department of Dermatology,

SIMS/ Services Hospital, Lahore.

Email: kemcolianhira46@gmail.com

A transdermal medicine delivery technique, called microneedling, works by making tiny holes in the stratum corneum. In addition to increasing medication absorption, it triggers melanocytes to mechanically migrate from margins to amelanotic zones. It causes healing wounds and induces the release of several growth factors. A fractional microneedling tool is the Dermapen. Its automated needling motion improves efficacy, reduces discomfort and suffering, and encourages uniform topical absorption.⁷ An Indian study conducted by Chhabra *et al.*⁸ included 46 patients (43.4% male patients and 56.6% female patients having mean age 29.4 ± 8.66 years mean age and 5.04 ± 1.49 years mean disease duration) and reported good response in 43.7%, very good response in 28.1% and excellent response in 16.9% with microneedling after 2 months of last session. Another study conducted on 30 patients (± 9.31 years of age with 3.16 ± 1.02 years duration of illness) reported 33.3% excellent response and 43.3% poor response after 3 months of last session.¹

Vitiligo has a substantial impact on a patient's quality of life, affecting both self-esteem and psychosocial development. Although vitiligo is a benign disorder, it is associated with social stigmatization causing negative effect on patient's quality of life.⁹ So, we have planned this study to ascertain the effectiveness of microneedling in our local population. When the benefits of a more effective therapy are observed in our community, it will be possible to treat patients more successfully, relieving them of psychological and social issues and ultimately improving their productivity and quality of life.

Methods

This single group clinical trial was conducted at the Department of Dermatology, Nishtar Medical University, from September, 2022 to March, 2023. Patients of localized vitiligo were

enrolled by non-probability consecutive sampling. Inclusion criteria included ages ranging from 18-60 years, patients of both genders with localized vitiligo with disease duration more than 12 months. Exclusion criteria included patients already taking any other treatment within the past 6 months, keloids or hypertrophic scarring on clinical examination, active infection or bleeding disorders (from clinical record file).

Each patient was required to give informed consent. Baseline information like gender, age, educational status, BMI and disease duration was noted in proforma. Under aseptic conditions, local anaesthesia was infiltrated in the lesions of vitiligo (as defined in operational definitions) following which microneedling was performed very slowly, with needle penetrating depths varying from 0.25 to 0.5 mm over the face and 1 to 2 mm over the body in both directions (horizontal and vertical), until the end-point of pin-point bleeding. This was repeated fortnightly for three months. Repigmentation was assessed and graded before each session and at follow-ups. Photographs were taken before starting treatment, at each session and at follow-ups. All information was noted in the proforma.

SPSS Ver. 25.0 was used for entering and analyzing the data. The age, size and number of lesions, patient BMI, and length of disease were all calculated, as were the means and standard deviations. For the categorical variables of gender, education level, residence status, age groups, efficacy, and obesity, frequencies and percentages were computed. Using stratified tables, effect modifiers such as age, gender, obesity, educational attainment, length of illness, and residential status were managed. To determine its impact on effectiveness, the post-stratification chi-square test was used. A p-value of 0.05 or less was regarded as significant.

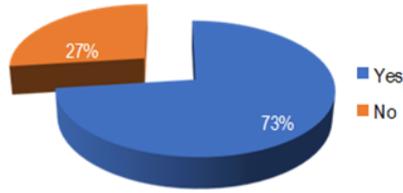


Figure 1 Efficacy of micro-needling in patients with localized vitiligo.

Results

Forty five (40.5%) of the 111 study cases were male patients, and the remaining 66 (59.5%) were female. The average age of our patients was 27.91 ± 9.49 years; ranged 18 to 50 years. The mean age of the male and female patients was found to be 29.18 ± 10.13 and 27.01 ± 9.01 years, respectively ($p=0.247$). 88 (79.3%) patients, according to the results of our study, were under 40 years old. 54 patients (48.6%) and 57 patients (51.4%) were from urban and rural areas, respectively. 42 people (37.8%) had poor socioeconomic level, whereas 69 people (62.2%) belonged to the middle class. Twenty-two (19.8%) patients had a positive family history of vitiligo.

Discussion

Vitiligo is primarily a disease of limited or generalized pigmentation of the skin and mucous membranes associated with genetic factors, melanocyte self-destruction, cytokines, autoimmunity and oxidative stress. Therapies are selected for every patient depending on severity of disease, disease activity (progressive or stable), patient preferences (including availability and cost), and assessment of response. In progressive disease, low dose oral steroids and phototherapy are considered beneficial. Treatment for stable lesions of vitiligo includes topical and surgical therapy (tissue transplantation and cell transplantation). Recently, there have been attempts to improve vitiligo phototherapy repigmentation with combination therapy including NBUVB

glucocorticoids and topical calcineurin inhibitors. Although their positive results have not been confirmed in all studies. However, the described treatments, which were non-specific, general, abnormal, with moderate efficacy, led to the problem of relapse after stopping treatment. Therefore, efforts must be made to achieve a more comprehensive understanding of the pathogenesis of vitiligo in order to develop new and effective therapies.¹⁰

In our study, 45 patients (40.5%) were male while 66 (59.5%) were female patients. Ali *et al.*¹¹ from Bangladesh also reported 66.6% female gender predominance in vitiligo patients. An Indian study conducted by Chhabra *et al.*,⁸ Paracha *et al.*¹² from Lahore and Zandi *et al.*¹³ from Iran also reported female preponderance in vitiligo.

Mean age of our study cases was 27.91 ± 9.49 years (with range of 18 years to 50 years). Mean

Table 1 Stratification of efficacy with respect to effect modifiers.

	Patients (n=111)		p-value
	Efficacy		
	Yes	No	
<u>Age</u>			
< 40 (n=88)	67 (76.14%)	21 (23.86%)	0.142
> 40 (n=23)	14 (60.87%)	09 (39.13%)	
<u>Gender</u>			
Male (n=45)	34 (75.56%)	11 (24.44%)	0.613
Female (n=66)	47 (71.21%)	19 (28.79%)	
<u>Duration of Disease (Years)</u>			
≤ 2.5 (n=70)	63 (90%)	07 (10%)	0.001
>2.5 (n=41)	18 (43.90%)	23 (56.10%)	
<u>Obesity</u>			
Yes (n=19)	13 (68.42%)	06 (31.58%)	0.624
No (n=92)	68 (73.91%)	24 (26.09%)	
<u>Residential status</u>			
Urban (n=54)	37 (68.52%)	17 (31.48%)	0.304
Rural (n=57)	44 (77.19%)	13 (22.81%)	
<u>Family history</u>			
Yes (n=22)	19 (86.36%)	03 (13.64%)	0.114
No (n=89)	62 (69.66%)	27 (30.34%)	
<u>Education status</u>			
Illiterate (n=30)	23 (76.67%)	07 (23.23%)	0.594
Literate (n=81)	58 (71.60%)	23 (28.40%)	
<u>Marital status</u>			
Married (n=45)	30 (66.67%)	15 (33.33%)	0.217
Unmarried (n=66)	51 (77.27%)	15 (22.73%)	

age of the male patients was noted to be 29.18 ± 10.13 years while that of female patients was 27.01 ± 9.01 years ($p=0.247$). A majority of our study cases i.e. 88 (79.3%) were aged up to 40 years. An Indian study conducted by Chhabra *et al.*⁸ Ali *et al.*¹¹ from Bangladesh, Zandi *et al.*¹³ from Iran and Paracha *et al.*¹² from Lahore have reported mean ages similar to this study's results.

Ali *et al.*¹¹ from Bangladesh have also reported 86% patients belonged to rural areas and 53.33% belonged to middle income families, these findings are similar our results where 51.4% belonged to rural areas. Family history of vitiligo was positive in 22 (19.8%) of our study cases, similar to 13.3% cases reported by Ali *et al.*¹¹ and 28.8 % reported by Zandi *et al.*¹³

Efficacy was noted in 81 (73.0%) patients in this study. An Indian study conducted by Chhabra *et al.*⁸ included 46 patients and reported good response in 43.7%, very good response in 28.1% and excellent response in 16.9% with microneedling after 2 months of last session. These deductions were in concordance with our observations probably because of comparable ethnic background of study populations.

Small sample size is a limitation of this study, however, it may provide a basis for further experimental and analytical research on this resistant disease.

Conclusion

The results of this study demonstrate that micro-needling is effective and safe to use in the targeted population of patients with localised vitiligo. All clinicians treating these patients can effectively use micro-needling to treat localized vitiligo and achieve desired clinical results to reduce psycho social stress in these patients.

Declaration of patient consent The authors certify that they have obtained all appropriate patient consent.

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Conflict of interest Authors declared no conflict of interest.

Authors' contribution

MF, RT, HT: Substantial contribution to study design, acquisition of data, manuscript writing, has given final approval of the version to be published.

AA, SB, FA: Substantial contribution to analysis and interpretation of data, critical review, final approval of the version to be published.

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